



Earth Observations for Societal Benefits: Research Directions

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Topics

- ✧ Global and Local Challenges
- ✧ A Renewed Imperative for Earth Observations
- ✧ Baselines and New Observations
- ✧ Research Directions

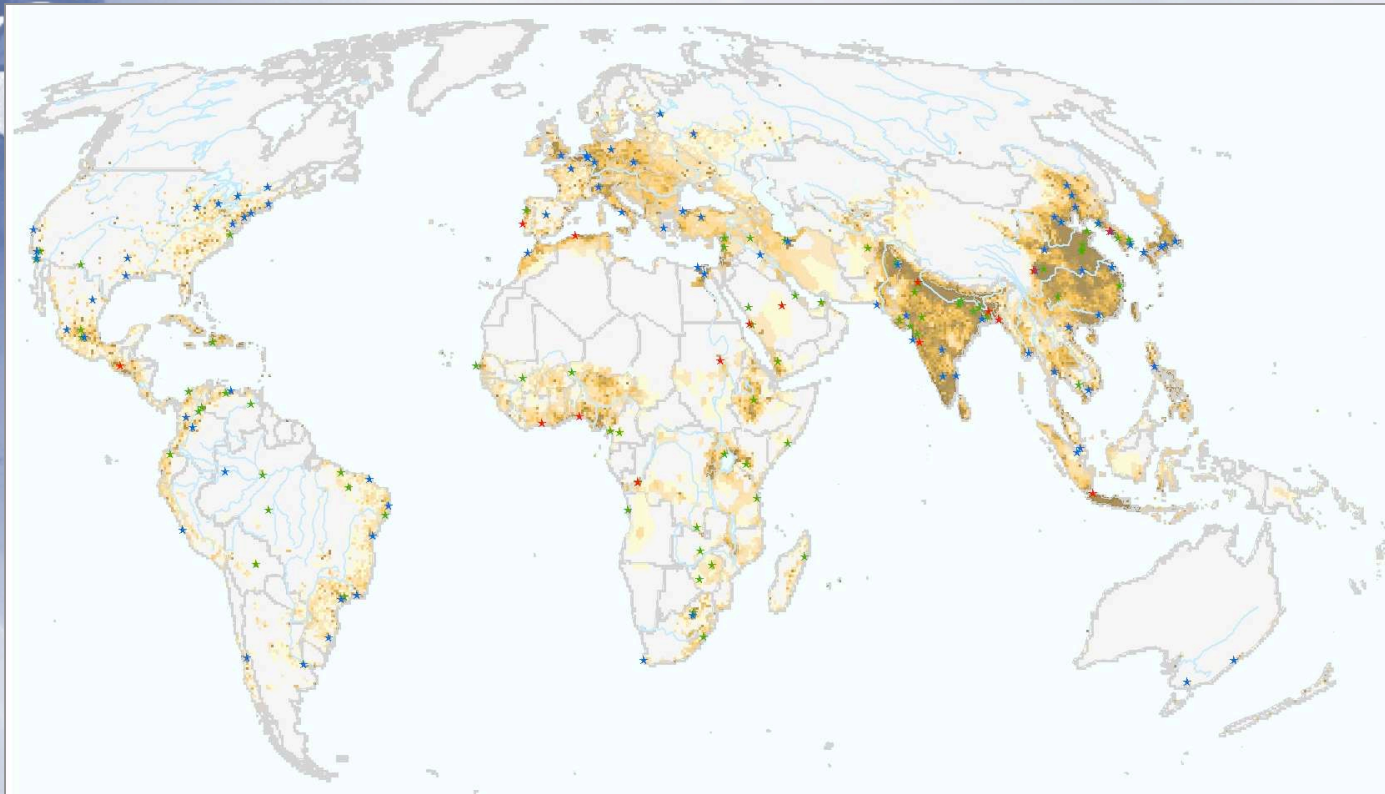


Setting the Stage

- ✧ **Food Security:** the expectation that people will have sufficient food of high quality to sustain themselves;
- ✧ **Energy Security:** the need of societies for supplies of abundant, safe, and environmentally acceptable supplies of energy;
- ✧ **Early Warning of Floods, Drought, Storms, Landslides, Earthquakes, and other natural hazards:** the need to prepare and provide warning to populations at risk of severe and sudden events
- ✧ **Sustainability of Ecosystem Services:** the need to maintain the supply of provisioning, regulating, cultural, and supporting services from ecosystems for meeting basic human needs
- ✧ **Environmental Quality and Contamination:** the need to maintain a healthy environment with a minimum of pollution and contamination
- ✧ **Public Health:** the need to maintain and enhance the health status of people
- ✧ **Education and Outreach:** the need to create and maintain a scientifically literate public in an increasingly technologically dominated world

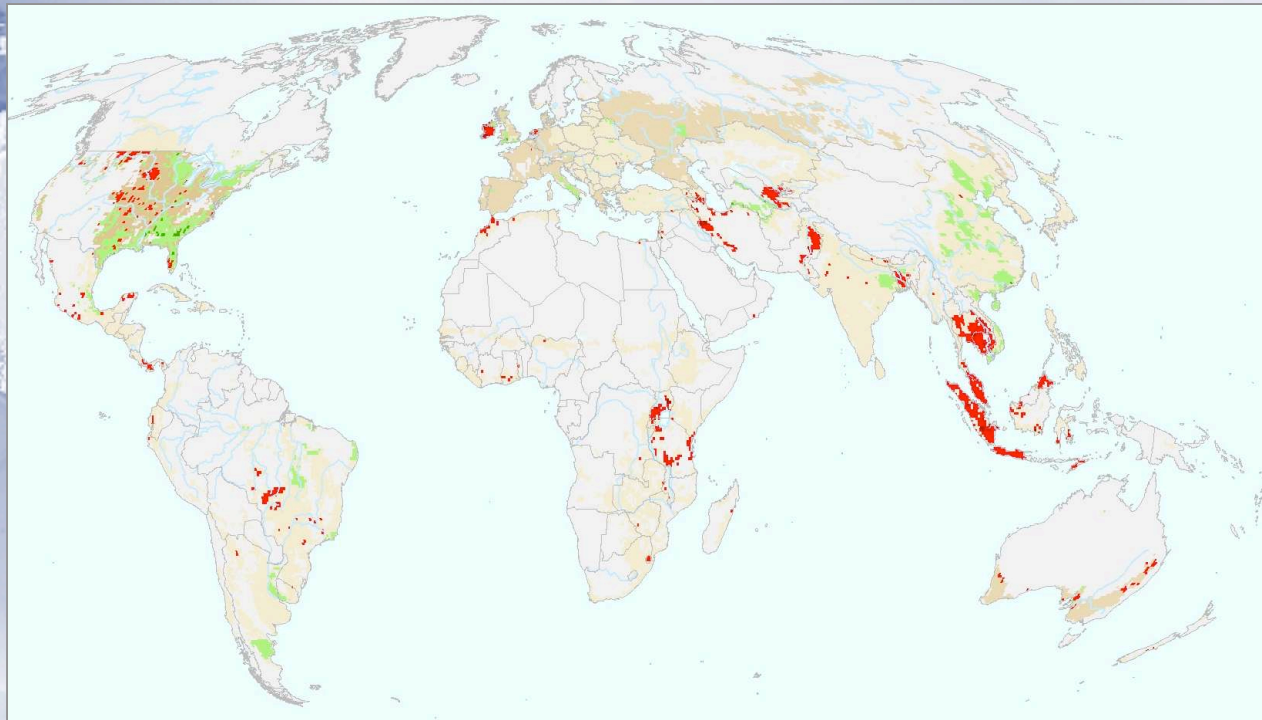
Global and Local Challenges

✧ Urbanization and Development



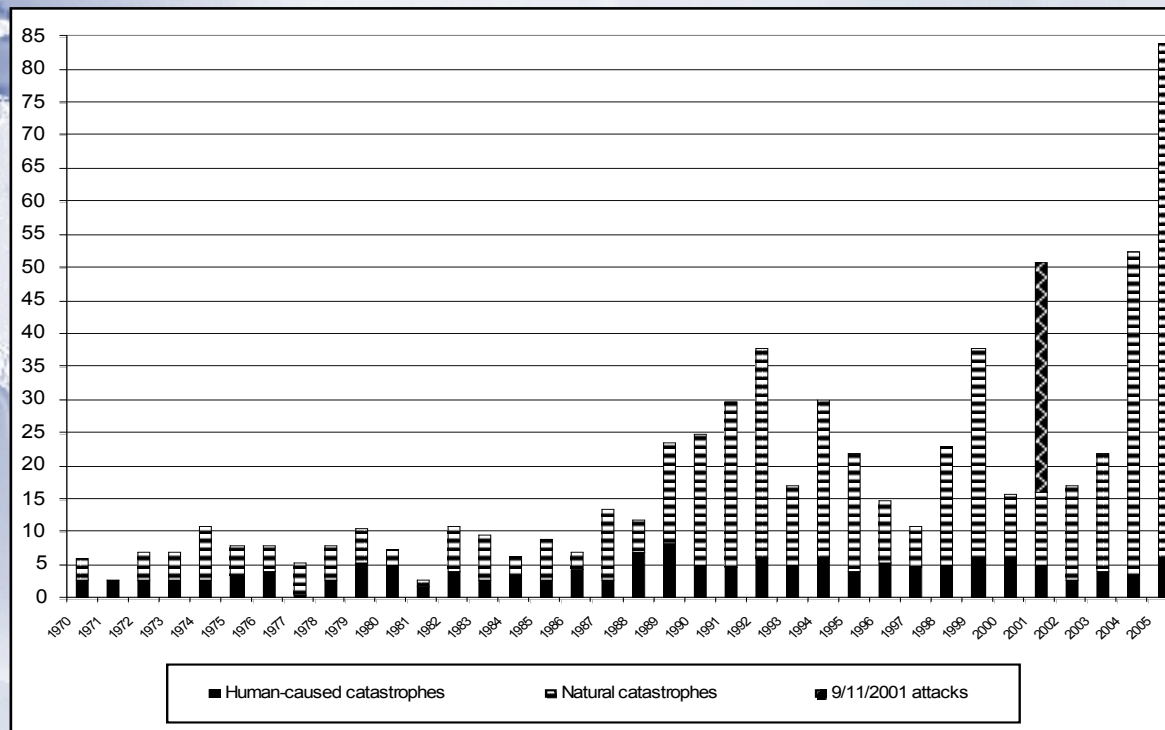
Global and Local Challenges

✧ Water and Food Security



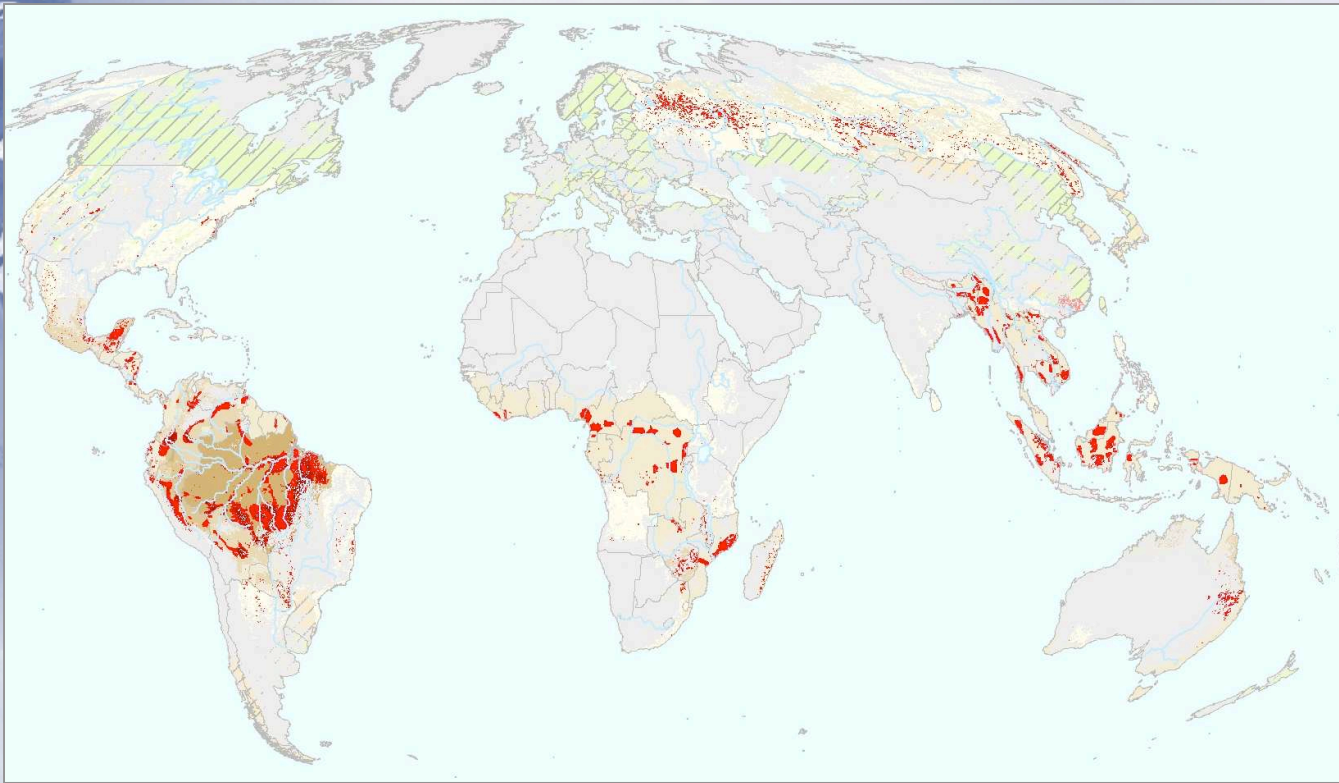
Global and Local Challenges

✧ Natural Hazards



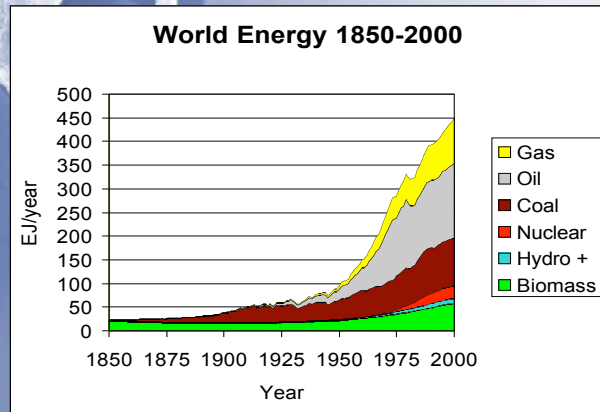
Global and Local Challenges

✧ Natural Resource Management



Global and Local Challenges

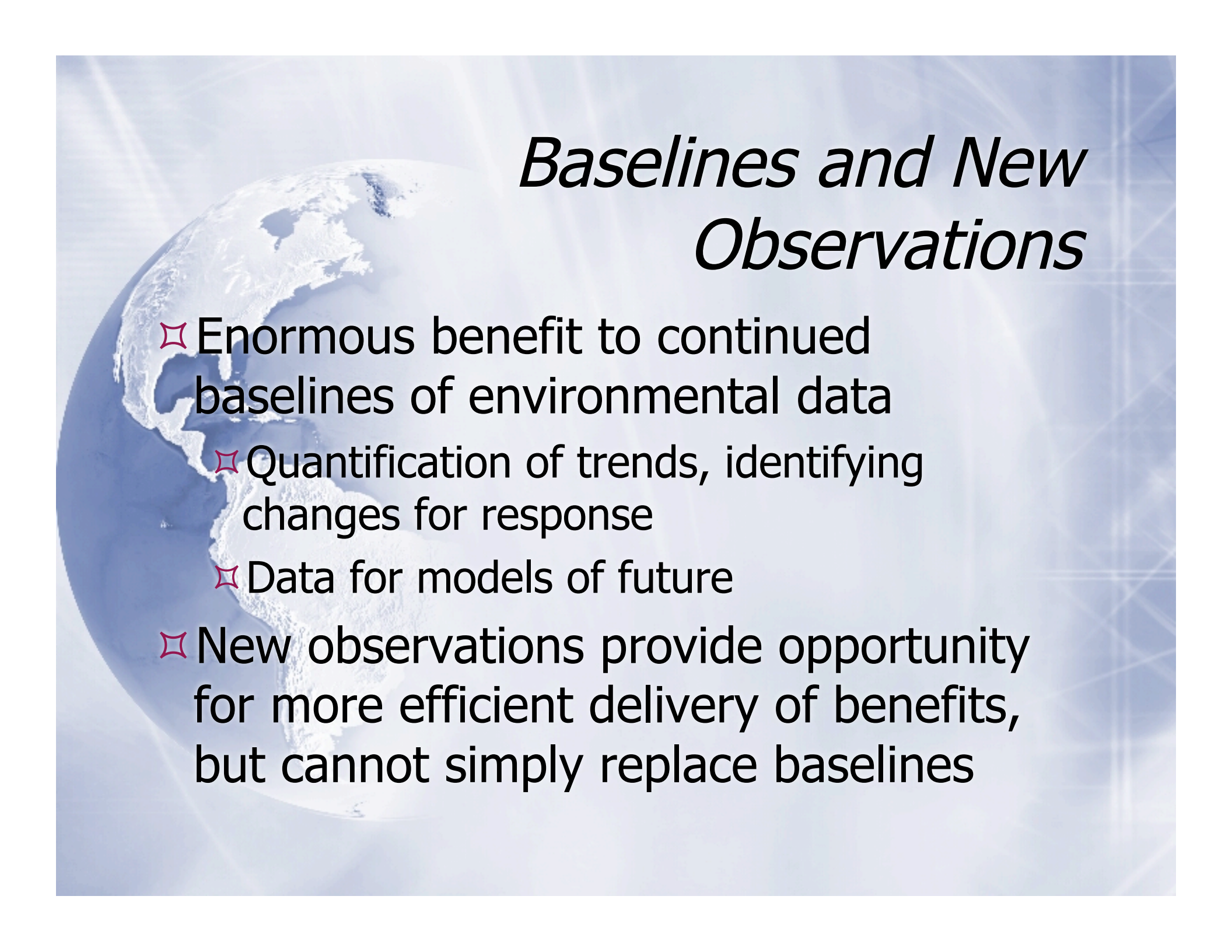
✧ Climate Change and Energy





A Renewed Imperative

- ✧ How will Earth science and observations help?
- ✧ Increase human well-being as well as satisfy scientific curiosity
 - ✧ Safety, health, prosperity
 - ✧ Maintaining services we depend on
- ✧ Building a capacity for delivering tangible benefits



Baselines and New Observations

- ✧ Enormous benefit to continued baselines of environmental data
 - ✧ Quantification of trends, identifying changes for response
 - ✧ Data for models of future
- ✧ New observations provide opportunity for more efficient delivery of benefits, but cannot simply replace baselines



Research Directions

- ✧ Must understand who benefits from using observations and how they do so
- ✧ How are observations actually used by people?
 - ✧ Intermediate organization (e.g. a weather service)
 - ✧ Directly (e.g. Google Earth or precision agriculture)
- ✧ How are decisions made with the information?



Research Directions

- ✧ What is best way to access data?
 - ✧ Historical archives
 - ✧ Real-time access
- ✧ Are the observations used directly or as input to a numerical model?
- ✧ What information is used in addition to the Earth observations?



Research Directions

- ✧ Must move beyond a collection of case-studies to general understanding
- ✧ How valuable are the remotely-sensed data?
- ✧ How is such information used in both public and private sectors?
- ✧ What are the true barriers to use?
- ✧ How is feedback to the agencies structured and used?



Learning from Experience

- ✧ How do NASA and NOAA currently set priorities for missions/observations, at least in principle?
- ✧ Measurements/programs that have made the transition from research into operational modes successfully - e.g. numerical weather forecasting
- ✧ Measurements/programs that have become “quasi-operational” - e.g. fire detection, air quality, agricultural output, famine early warning



Learning from Experience

- ✧ No stable institutional home for receiving recommendations about benefits in either NASA or NOAA
- ✧ Need to have processes in NASA and NOAA that recognize the actual benefits that are generated in addition to their scientific foundation
- ✧ Communities have vastly different experiences in using these observations and therefore abilities to generate recommendations

The background of the slide features a view of the Earth from space, showing the Western Hemisphere with North and South America visible. Overlaid on this is a faint, glowing network of white lines, suggesting global connectivity or data flow.

From Serendipity to Design

- ✧ New processes for identifying needs, especially in “new” areas
- ✧ Research programs on how applications have been usefully developed in the past and barriers to application
- ✧ Importance of continued access to data and information products
- ✧ Enhancing the ability of newer communities to use observational data